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Anomalous first–phase formation in rapidly thermal annealed, thin– layered Si/Ni/Si films.

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Applied Physics Letters, {Appl–Phys–Lett–USA}, 4 Aug. 1986, vol. 49, no. 5, p. 257–9, 12 refs, CODEN: APPLAB, ISSN: 0003–6951, USA.

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Abstract

The initial stages of silicide formation in very thin–layered Si/Ni/Si films reacted by rapid (pulsed) annealings were investigated using the rapid thermal annealing/transmission electron microscopy technique. At least four phases, **NiSi,** deltaNi/sub 2/Si, thetaNi/sub 2/Si, and Ni /sub 31/Si/sub 12/, are shown to form first after 1 s annealings in the 175–300°C temperature regime; the actual phase and its nucleation kinetics depend on the Si:Ni **ratio** and on substrate deposition temperature. An amorphous (Ni+Si) mixture is shown to exist as a precursor to thetaNi/sub 2/Si and **NiSi.** The multiplicity of `first' phases and the dependence on the Si:Ni **ratio** contradict various `first–phase' rules and steady–state annealing data obtained on thicker films and in metal–Si wafer reactions. A simple model that accounts for the stoichiometry and substrate–temperature dependences is suggested.

Language

English.

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1986.

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Enhanced thermal stability of NiSi films on Si(111) substrates by a thin Pt interlayer.

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Abstract

A thin interlayer of Pt can greatly enhance the thermal stability of **NiSi** films formed by rapid thermal annealing (RTA) on Si(111) substrates, as was revealed by X–ray diffraction (XRD) data and sheet resistance measurement. High–resolution transmission electron microscopy (HRTEM) reveals a well–defined interface between the Ni(Pt) Si film and the Si(111) substrate for the Ni/Pt/Si sample annealed at 640°C. The orientation relationship in this sample determined by selected area electron

diffraction (SAED) was **NiSi(100)**parallel/Si (111) and **NiSi(01macron0)**parallelSi(011macron). With the increase of temperature, the texture of **NiSi** films transform from **NiSi(100)** parallelSi(111) to **NiSi(001)**parallelSi(111). The reduction in the interfacial energy due to the formation of the (100) textured **NiSi** film is proposed as a possible reason for the improved thermal stability of **NiSi** and the transition in **NiSi** texture during high– temperature annealing. Detailed study on the XRD data combined with Auger electron spectra (AES) indicates PtSi and **NiSi** form a solid solution following Vegard's law, which adjusts the lattice constant **ratio** c/b to surd3 and may account for the texture of **NiSi(100)** parallelSi(111).

Language

English.

Publication year

2000.

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Search Strategy

No.	Database	Search term	Info added since	Results
1	INZZ	(nickel ADJ monosilicide OR NiSi) AND ratio	unrestricted	60

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